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Utilization Research & Development Division

Publications and Patents

July - December 1966

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**Agricultural Research Service
United States Department of Agriculture**

CONTENTS

	Page
Introduction	3
Request for Information	3
Subject Index for Publications	4
Publications	5
Patents.	38
Licensing of Patents	41

Northern Utilization Research and Development Division
Agricultural Research Service
United States Department of Agriculture
1815 North University
Peoria, Ill. 61604

INTRODUCTION

The Congress in 1938 authorized four regional laboratories, now known as Utilization Research and Development Divisions, to conduct basic and applied research designed to expand, improve, and develop through science and technology the utilization of American farm crops. The need and importance of such research arise because the farmer is not organized to carry on modern scientific research to maintain old markets for his products and to create new ones. Since their inauguration, these laboratories have contributed much basic knowledge of the chemical composition and physical properties of farm commodities and have applied this knowledge to create new or improved products and processing technology that have enhanced utilization of many farm commodities.

The Northern Utilization Research and Development Division is responsible for research on industrial utilization of the cereal grains—corn, wheat, barley, grain sorghum, and oats; and the oilseeds—soybeans and flaxseed. Except for

wheat and barley, the research includes food and feed uses of these crops. In the Department's program of research on replacement crops, the Northern Division conducts all screening and characterization studies on uncultivated plants and their components. It is also responsible for more intensive research on new oilseeds containing erucic acid and on new gum and pulp fiber plants. In addition to its internal program of research, it carries out work through domestic contracts and grants and conducts related research abroad under grants or contracts involving Public Law 480 funds.

The research investigations at the Northern Division are supported by more than 400 people, about one-half of whom have professional status. This body of highly trained men and women with specialized knowledge in various disciplines are responsible for the scientific publications and patents listed here.

REQUEST FOR INFORMATION

The results of the research of the Northern Utilization Research and Development Division are published regularly in the technical literature, and public-service patents are secured to cover patentable inventions and discoveries (see page 38). As a convenient guide to our publications and patents, a list with abstracts is published semi-annually. The abstracts describe the current research and indicate the progress achieved. Further information on any of the developments, as well as earlier technical papers, may be obtained by writing us.

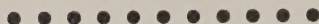
In conformance with the policy of the Department of Agriculture, Northern Division publications are available to scientists and other specialists, librarians, representatives of the press, and others interested.

Requests for specific reprints should be by number and addressed to the Northern Division. Those titles marked with an asterisk [*] are not available for distribution.

Most of the publications are in journals that are available in libraries. Photographic copies of most journal articles on research at this Division can be purchased from the National Agricultural Library of the U.S. Department of Agriculture, Washington, D.C. 20250.

No publications will be sent regularly in response to foreign requests unless exchange arrangements have been made with the Director of the National Agricultural Library.

Copies of previous lists of publications and patents are available upon request.



SUBJECT INDEX FOR PUBLICATIONS

[Compiled by reprint order number. Numbers marked (*) do not have reprints available for distribution.]

CEREAL GRAINS

General:

2047, 2059, 2076*, 2085, 2093, 8-G, 10-G*, 11-G, 12-G,
111-F, 126-F, 129-F, 135-F

Starch:

2057, 2060, 2071, 2098, 2100, 2102, 169-C, 172-C, 173-C,
9-G, 116-F, 124-F, 134-F

Wheat:

2031, 2046, 2049, 2073, 2075, 2094, 2102, 2103, 118-F,
131-F

Corn, Sorghum, and Other Grains:

2058*, 2072, 2089, 112-F, 113-F

Fermentative Conversion and Microbiology:

2043, 2050, 2056, 2061, 2062, 2063, 2069, 2070, 2073,
2075, 2077, 2081, 2084, 2092, 2096, 2101, 2104, 2105,
2108, 115-F, 120-F, 121-F, 122-F, 123-F, 125-F, 132-F

OILSEEDS

General:

2033, 2038, 2040, 2041, 2053, 2054, 2055, 2079, 2082,
2083, 2088, 2095, 2106, 2109, 170-C, 109-F*

Linseed Oil:

2040, 2052, 2079, 2099, 109-F*

Soybean Oil:

2032, 2039, 2051, 2065, 2087, 2091, 119-F*, 137-F

Soybean Meal and Protein:

2042, 2074, 2086, 2090, 2110, 110-F, 114-F, 127-F, 128-F,
133-F, 136-F

NEW CROPS

General:

2009

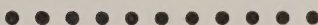
Oilseeds:

2030, 2034, 2035, 2036, 2037, 2045, 2048, 2064, 2066,
2067, 2068, 2080, 2097, 117-F

Pulping Crops:

2044

July — December 1966



PUBLICATIONS

[Publications marked (*) are not available for distribution. When requesting reprints, order by number.]

2009 • New Crops. A List of Publications and Patents for 1965

North. Util. Res. Develop. Div.

U.S. Agr. Res. Serv., ARS-71-19-4, 5 pp. July 1966 [Processed]

2030 • Gas-Liquid Chromatography of Silylated Mixtures from Lipolysis of Triglycerides Containing Unusual Fatty Acyl Groups

W. H. TALLENT, R. KLEIMAN, and DIANA G. COPE

J. Lipid Res. 7(4): 531-535. July 1966

A convenient and rapid procedure involving methylation, silylation, and temperature-programmed gas-liquid chromatography (GLC) is described for analyzing unfractionated products from hydrolysis of triglycerides with pancreatic lipase. The conditions employed for GLC were selected to provide maximum and rapid separation of silylated monoglycerides in which the acyl moieties differ in chain length or degree of substitution with oxygen-containing functional groups. Derivatives differing only in the number of double bonds present were not separated. In the curves

from GLC, generally peaks representing methyl esters are readily distinguishable from those of other components. Therefore, the extent of lipolysis and the composition (with respect to chain length and substitution of acyl groups) of monoglycerides formed are determined simultaneously.

The accuracy of the new method was demonstrated with standard mixtures and by comparison of results for several lipolysis products with data secured by conventional procedures.

2031 • Reducing the Microbial Population of Flour by Warm Storage

CHARLES VOJNOVICH and V. F. PFEIFER

Northwest. Miller 273(7): 12-14. July 1966

When flour is stored at temperatures from 82° to 142° F., the microbial count can be reduced to low levels with little flour damage. With a flour of high microbial population, 100,000 bacteria per gram, the count was reduced to 5,000 per gram by storing for about 4 months at 82° F., 24 days at 99° F., 7 days at 115° F., less than 1-1/2 days at

125° F., or less than 1 day at 135° F. or higher. The count was reduced below 500 per gram by storing an equal additional time at a given temperature. The rate of destruction of microorganisms displayed an Arrhenius dependence upon temperature of storage.

2032 • Key Factors and Recent Advances in the Flavor Stability of Soybean Oil

J. C. COWAN

J. Am. Oil Chemists' Soc. 43(7): 300A, 302A, 318A-321A. July 1966

The influence during soybean processing of metallic impurities, their inactivation, proper protection for the oil, hydrogenation-winterization, and other new aspects are reviewed. Commercial application of this information has shown that

soybean oil stability can be improved. These improvements in quality of the soybean oil extend its usefulness. Also, research has discovered selective catalysts that may lead to still further improvements.

2033 • Thermal Conductivity Effect of Carrier Gases on Flame-Ionization Detector Sensitivity

R. L. HOFFMANN and C. D. EVANS

Science 153(3732): 172-173. July 1966

Data for six carrier gases of different thermal conductivities show a linear correlation between the logarithm of thermal conductivity and detector

response. Carbon dioxide, which has a lower thermal conductivity than helium, gives a ninefold increase in detector response.

2034 • Stereochemistry of α -Parinaric Acid From *Impatiens edgeworthii* Seed Oil

M. O. BAGBY, C. R. SMITH, JR., and I. A. WOLFF

Lipids 1(4): 263-267. July 1966

α -Parinaric acid is a major constituent fatty acid (48%) from *Impatiens edgeworthii* Hook F. seed oil. Partial hydrazine reduction of the tetraene gave products which permit defining the stereochemistry of α -parinaric acid. Its structure

is *cis*-9,*trans*-11,*trans*-13,*cis*-15-octadecatetraenoic acid. The tetraene readily reacts with maleic anhydride to give the Diels-Alder product with no *trans*-unsaturation. The formation of this adduct is contrary to previous reports.

2035 • Keto Fatty Acids from *Cuspidaria pterocarpa* Seed Oil

C. R. SMITH, JR.

Lipids 1(4): 268-273. July 1966

The seed oil of *Cuspidaria pterocarpa* contains three keto fatty acids with unusually long carbon chains: 15-oxo-*cis*-18-tetracosenoic (5.4%), 17-oxo-*cis*-20 hexacosenoic (13.4%), and 19-oxo-*cis*-22-octacosenoic (3.3%). These acids were iso-

lated by countercurrent distribution of their corresponding methyl esters. Their structures were established by oxidative degradation, by reduction to known compounds, and by nuclear magnetic resonance and infrared spectra.

2036 • Optically Active Aceto-triglycerides of Oil from *Euonymus verrucosus* Seed

R. KLEIMAN, R. W. MILLER, F. R. EARLE, and I. A. WOLFF

Lipids 1(4): 286-287. July 1966

Seed oil of *Euonymus verrucosus* contains about 90% monoaceto-triglycerides. These triglycerides have observable optical rotation ($[\alpha]_D^{25} = -0.5^\circ$, $[\alpha]_{350}^{25} = -1.9^\circ$) caused by asymmetry of the central glycerol carbon atom. Such

optical activity in unchanged natural triglycerides has not been previously observed. Comparison with synthetic products of known configuration shows that this natural material is essentially all (S)-1-aceto-triglyceride.

2037 • Investigation of the Glyceride Structure of *Cardamine impatiens* L. Seed Oil

K. L. MIKOLAJCZAK, C. R. SMITH, JR., and I. A. WOLFF

Lipids 1(4): 289-290. July 1966

Cardamine impatiens seed oil contains 40% of a triglyceride component that has free hydroxyl groups and also contains acetate groups. Enzymic hydrolysis of this glyceride with the glycerol ester hydrolase from *Ricinus communis* (castor-bean) seed yields a fragment containing equimolar

amounts of nonhydroxylated fatty acids and long-chain dihydroxy fatty acids. The acetate function is also attached to this fragment. Nuclear magnetic resonance data suggest that a dicarboxylic acid is also incorporated into this triglyceride in some manner.

2038 • An Improved Tank for Development of Preparative Thin-Layer Chromatograms

R. L. HOFFMANN and C. D. EVANS

Lipids 1(4): 292. July 1966

A tank is described that allows rapid, nearly horizontal, development of thin-layer chromato-

grams on heavy adsorbent layers.

2039 • Mechanism of Lipoxidase Reaction: Origin of the Oxygen Incorporated into Linoleate Hydroperoxide

AMI DOLEV, T. L. MOUNTS, W. K. ROHWEDDER, and H. J. DUTTON

Lipids 1(4): 293. July 1966

Two experiments were designed to detect the origin of the oxygen molecule incorporated into hydroperoxide: the incubation of lipoxidase with linoleic acid in a $H_2^{18}O$ buffer with $^{16}O_2$ in the gas phase and the same incubation but in normal $H_2^{16}O$ buffer with isotopic $^{18}O_2$ in the gas phase. No isotopic ^{18}O was detected in the product from

the first experiment, which used $H_2^{18}O$ water, but all the hydroxystearate from the second experiment, which used $^{18}O_2$, was labeled. Since lipoxidase does not catalyze oxygen exchange between water and gas, the oxygen incorporated into the hydroperoxide molecule by lipoxidase comes from the gas phase.

2040 • Calibration, Coincidence Correction, and Interpretation of Coulter Counter Data

L. H. PRINCEN

Proc. 5th Coulter Counter Conference, San Francisco, Calif., October 21-22, 1965, pp. 94-100. August 1966

After study of the behavior of the Coulter counter under various conditions, its calibration and coincidence corrections for data proved not so simple as previously described. Calibration with only one or two systems of supposedly known particle size is not satisfactory; instead, five or six such systems representing a wide range of sizes should be used. After critically reviewing the coincidence phenomenon, it was concluded that for each aperture-manometer combination the correction constant must be determined

experimentally. The interpretation is given of counter data, especially of truncated distributions, to arrive at a satisfactory mean particle size and standard deviation. For a study on particle size distributions of oil-in-water emulsions, a specialized program for a digital computer was developed to determine the mean particle size and standard deviation directly from experimental data. The coincidence corrections are built into this program and do not have to be calculated separately.

2041 • Flame Ionization Detector Sensitivity Increased by Hyperoxygenation

R. L. HOFFMANN and C. D. EVANS

J. Gas Chromatog. 4(8): 318. August 1966

Oxygen gas fed into the hydrogen stream immediately before the flame jet caused an increase in peak-height sensitivity of the detector. Any

increase in sensitivity is a direct measure of the efficiency with which the burner housing receives oxygen from its air supply.

2042 • Rate Studies on Atmospheric Steaming and Immersion Cooking of Soybeans

W. J. ALBRECHT, G. C. MUSTAKAS, and J. E. MCGHEE

Cereal Chem. 43(4): 400-407. July 1966

Simple methods for adequately cooking soybeans to produce a full-fat flour would enable populations in many of the developing countries to have a food that would provide needed protein in their diet. The variables of initial moisture, particle size, and hull removal were correlated with rate of cooking as defined by change of

urease activity and nitrogen solubility index. Initial moisture of the soybean particle was the major factor influencing cooking rate. Trypsin inhibitor activity was destroyed at approximately the same rate as urease enzyme activity by both cooking methods.

2043 • Organic Acids in the Haemolymph of Healthy and Diseased *Popillia japonica* (Newman) Larvae

ROBERT D. STUBBLEFIELD, GLENN A. BENNETT, ODETTE L. SHOTWELL, HARLOW H. HALL, and RICHARD W. JACKSON
J. Insect Physiol. 12(8): 949-956. August 1966

Organic acid constituents in the hemolymph of healthy and diseased *Popillia japonica* larvae were determined by partition chromatography, enzymic analyses, and colorimetric procedures. Hemolymph from larvae infected with *Bacillus popilliae* Dutky, compared with that from healthy larvae, contained higher concentrations of malic, glycolic, tartaric, pyruvic, and glyoxylic acids.

No change in concentrations of butyric, propionic, acetic, formic, succinic, lactic, citric, and α -ketoglutaric acids occurred when larvae were infected. None of the acids decreased during the course of milky disease. Gluconic and oxaloacetic acids were detected in the hemolymph but not determined. Organic acids account for most of the anion titre in the hemolymph.

2044 • Fiber and Papermaking Characteristics of Bamboo

J. R. HAUN,¹ T. F. CLARK, and GEORGE A. WHITE¹
(¹ USDA Crops Research Div., Beltsville, Md.)
U.S. Dept. Agr., Tech. Bul. 1361, 19 pp., August 1966

Chipped bamboo culms of *Phyllostachys meyeri* and *P. bambusoides* compare favorably in density to hardwood and softwood logs not debarked. As a rule, bamboo fibers are about the same length as those of hardwoods but are shorter than those of most coniferous woods. Fibers from *Bambusa vulgaris* approximate the length of southern pine fiber. High length-to-width ratios indicate that bamboo fibers may have a possible use in the

manufacture of high-quality pulp for facial tissue and for book, bond, and stationery paper products. Of the several pulping methods used, the most promising were the kraft single-stage and the Raitt two-stage processes. Of the bamboo species studied, any could be used for papermaking. The choice of species to grow, therefore, depends largely on agronomic characteristics and availability of propagating material.

2045 • Variation in Enzymatic Degradation Products from the Major Thioglucosides in *Crambe abyssinica* and *Brassica napus* Seed Meals

C. H. VANETTEN, M. E. DAXENBICHLER, J. E. PETERS, and H. L. TOOKEY
J. Agr. Food Chem. 14(4): 426-430. July-August 1966

epi-Progoitrin, the principal thioglucoside of crambe seed, has at least two patterns of degradation in wetted seed meal. Under some conditions the product is a "cyano" fraction (I) consisting of (*S*)-1-cyano-2-hydroxy-3-butene and unknown substances containing sulfur, instead of the expected (*R*)-goitrin (II). Under other conditions both I and II are produced. Autolysis of 50 crambe seed meals at 25° C. with minimum amounts of water yielded only I from 29 accessions and both I and

II from 21. Formation of II is increased by diluting the meal with water, by increasing the temperature, by raising the pH, by dry heating of the seed meal, or by storage of the seed under ambient conditions (compared with cold storage). Under conditions of test, enzyme hydrolysis to form I only is faster than when I and II are formed. Tests with *Brassica napus* (rapeseed) showed a similar phenomenon in seed from this related plant.

2046 • Strontium-90 in 1965 United States Wheat

R. A. ANDERSON and V. F. PFEIFER

Radiol. Health Data 7(7): 381-382. July 1966

Representative mixes from the 1965 wheat harvest were procured from 13 different locations in 7 different wheat-producing states. These 7 states represented 52% of the total 1965 wheat production. Although sampling was probably inadequate for a precise calculation of the average of strontium-90 content of the 1965 U.S. wheat, the results permit a reasonable estimate. Projecting the values for the individual state averages (average of

locations within a state), weighted by the 1965 production figures to the entire 1965 wheat crop, the average is 95 picocuries per kilogram (dry basis). This estimate compares well with the U.S. Atomic Energy Commission's predicted average value of 88 picocuries per kilogram (dry basis) for 1965 U.S. wheat and confirms its prediction of a continuing downward trend in strontium-90 levels in wheat.

2047 • Improved Apparatus for the Amperometric Titration of Sulfhydryl Groups

JOHN A. ROTHFUS

Anal. Biochem. 16(1): 167-171. July 1966

Salt bridges used to connect a reference electrode and titration mixture in amperometric titration apparatus are constructed more easily with polyacrylamide than with agar. A polyacrylamide-bridged apparatus was equally responsive, yet more durable, than an agar-bridged apparatus in

the titration of glutathione or glutenin in urea solution with silver nitrate. Polyacrylamide gels expanded up to 66% in 10 *M* urea, depending upon monomer concentration and percentage of cross-linking.

2048 • (*R*)-13-Hydroxy-*cis*-9,*trans*-11-octadecadienoic Acid, The Principal Fatty Acid from *Coriaria nepalensis* Wall. Seed Oil

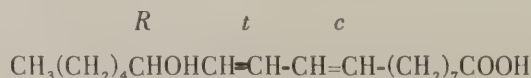
W. H. TALLENT, JEANNE HARRIS, I. A. WOLFF, and R. E. LUNDIN¹

(²West. Util. Res. Develop. Div., Albany, Calif.)

Tetrahedron Letters (36): 4329-4334. September 1966

Described for the first time are the isolation, as the methyl ester, and characterization of a 13-hydroxy-9, 11-octadecadienoic acid that occurs as the major fatty acid in a seed oil. The acid is optically active and is not accompanied by detectable amounts of the isomeric 9-hydroxy-10, 12-octadecadienoic acid. The 13-hydroxy-9,11-octadecadienoic acid, named coriolic acid, has one *cis* and one *trans* double bond. Nuclear magnetic double resonance showed that the *trans*

double bond is adjacent to the hydroxyl-bearing carbon atom, as expected, on biochemical and mechanistic grounds. The stereochemistry at C-13 was deduced from the optical rotatory dispersion curve. The complete structure of coriolic acid was established to be



2049 • Reducing Strontium-90 in Wheat and Milled Products

R. A. ANDERSON, V. F. PFEIFER, and E. L. GRIFFIN, JR.

Cereal Sci. Today 11(8): 328-330. August 1966

A process was developed that removes more than 70% of the strontium-90 from wheat containing about 400 picocuries per kilogram. In the process the wheat is extracted with dilute phosphoric acid for several hours at 25° to 30° C., rinsed, centrifuged, and dried carefully before conventional milling. Although feed fractions were improved the

most, strontium-90 levels in flour fractions were also reduced about 20% below those from the untreated wheat. In an emergency situation, percentage reduction would be considerably greater for grain contaminated after a heavy radioactive fallout.

2050 • Dextran

ALLENE JEANES

In "Encyclopedia of Polymer Science and Technology," vol. 4, chairman editorial board, Herman F. Mark, pp. 805-824. New York. 1966

The structure and the physical and chemical properties of dextran, the collective name of a large class of extracellular bacterial polysaccharides, are reviewed. Laboratory preparation, pilot-plant synthesis, and industrial manufacture

of dextran from *Leuconostoc mesenteroides* are discussed, as well as the numerous uses based on the distinctive characteristics that differentiate dextran from other polysaccharides of commerce.

2051 • Soybean Oil in Today's World. Key Problems in Flavor Stability

J. C. COWAN

Soybean Dig. 26(12): 48-53. September 1966

Soybean oil has good stability when properly processed and used. When the oil is mistreated by exposure to air, light, and certain metallic catalysts, it can develop off-flavors. In commercial operations, use of metallic inactivators, protection with nitrogen, and minimal exposure to light and air can eliminate the off-flavors in packaged products. Key factors in the stability of the oil are metallic impurities and their inactivation; content of linolenic esters which readily form off-flavors; and the exposure of the oil to heat, air, and light.

For many uses, hydrogenation does not appear necessary, but "protection" plus hydrogenation appears desirable for best results. For such uses as commercial deep-fat frying, hydrogenation or addition of hydrogenated products appears advisable based on present knowledge. Studies on hydrogenation-winterization, protection of unhydrogenated soybean oil, and catalysts for selective addition of hydrogen to soybean oil are reviewed.

2052 • Cyclic Fatty Acids: Removal of Aromatic Acids Formed During Hydrogenation

R. A. EISENHAUER, R. E. BEAL, L. T. BLACK, and J. P. FRIEDRICH
J. Am. Oil Chemists' Soc. 43(8): 515-518. August 1966

Monomeric fatty acids derived from the alkali treatment of linseed oil at temperatures above 200° C. contain cyclic and straight-chain fatty acids. Hydrogenation converts cyclic to liquid, saturated cyclic acids that can be recovered in a pure state by crystallization. During hydrogenation (palladium catalyst) some of the unsaturated cyclic acids form aromatic fatty acids by loss of hydrogen and under some conditions are not subsequently hydrogenated. It was necessary to establish conditions for complete hydrogenation since color and oxidative stability at high temperature are

inversely related to aromatic content. Previously, the preparation of cyclic acids free of aromatic acids was by hydrogenation in the presence of a high concentration of acetic acid. A further study of reaction variables established conditions to make saturated cyclic fatty acids free of aromatic without acetic acid. Factors favoring the elimination of aromatic acids include a high catalyst concentration, high temperature and pressure, good hydrogen dispersion in the liquid, and good agitation.

2053 • Enrichment of Volatile Samples by Syringe Collection

R. L. HOFFMANN, G. R. LIST, and C. D. EVANS
J. Food Sci. 31(5): 751-752. September-October 1966

Volatile samples for gas chromatographic analysis can be collected and enriched by slow passage through a gas-syringe barrel packed with

solvent-dampened cotton. Then the condensate can be injected into a gas chromatograph directly from the same syringe.

2054 • Gas-Solid Chromatography of Hydrocarbons on Activated Alumina. Effect of Carrier Gas on Retention Time and Column Efficiency

R. L. HOFFMANN and C. D. EVANS
Anal. Chem. 38(10): 1309-1312. September 1966

The quantitative accuracy of gas-solid chromatography (GSC) of hydrocarbons on activated alumina depends on instrumental parameters. Retention times, peak width, peak height, and column efficiency vary with certain molecular characteristics of the carrier gases used to elute hydrocarbons from activated alumina. These characteristics include mass, atomic cross section, and composition. Experimental data from GSC have been correlated with these molecular characteristics for eight pure carrier gases. The molecular weight

and structural types of hydrocarbons amenable to alumina GSC are strongly influenced by the particular carrier gas selected. Hydrogen and carbon dioxide elute saturated hydrocarbons up to C₁₂, whereas at the same theoretical plate efficiency helium can elute members up to C₆ only. For unsaturated hydrocarbons, degree of unsaturation and molecular weight set the elution limit. At elevated temperatures column efficiencies for the different carrier gases became similar.

2055 • Microreactor Chromatography. Quantitative Determination of Double Bond Positions by Ozonization-Pyrolysis

V. L. DAVISON and H. J. DUTTON

Anal. Chem. 38(10): 1302-1305. September 1966

Direct injection of ozonized fatty esters into the heated injector port of a gas chromatograph offers a one-step procedure for decomposing ozonides and for analyzing the resulting aldehydic fragments to determine double bond positions. In this manner, microliter samples of ozonides may be analyzed. Acidic functional groups, formed during thermal cleavage, have been effectively eliminated by inserting a short column containing well oxidized zinc granules or zinc oxide on an inert support between the injector port exit and

the fractionating column. Monoaldehydes and aldehydic esters were effectively separated in a temperature-programmed gas chromatograph and a mixed polyester-glycol, liquid-phase column. A microreactor apparatus has been developed as an independent accessory in which a 5- μ l. sample may be successively ozonized, thermally cleaved, and injected without sample transfer and attendant losses. This procedure provides an easy and rapid analysis and is particularly adapted to samples available only in limited amounts.

2056 • Sexual Agglutination in Yeast. IV. Minimum Particle Count per Cell for Fast-Sedimenting 5-Agglutinin

NEIL W. TAYLOR and ROBERT TOBIN

Arch. Biochem. Biophys. 115(2): 271-276. August 1966

Fast-sedimenting fractions of sexual agglutination activity digested from *Hansenula wingei* mating type 5 (5-agglutinin) were obtained by centrifuging in guanidine-hydrochloride or in sodium chloride gradients under conditions designed to produce the highest specific activity. The particles of 5-agglutinin in these fractions ranged from 120 to 300 million molecular weight as de-

termined by light scattering. An average at the agglutination end point was 1.7 particles of 5-agglutinin per cell. This number is reasonably close to the theoretical limit of 0.5 particle per cell and is comparable to the value of approximate unity for other precipitating and agglutinating systems.

2057 • Starch-Derived Glycol Glycoside Polyethers for Urethane Foams. Process Scale-Up, Performance in Foams, and Cost Estimates

R. H. LEITHEISER,¹ C. N. IMPOLA,¹ R. J. REID,¹ and F. H. OTEY

(¹Archer Daniels Midland Company, Minneapolis, Minn.)

Ind. Eng. Chem., Prod. Res. Develop. 5(3): 276-282. September 1966

In a pilot-plant study of the preparation of polyethers from glycol glycosides obtained directly from starch, scale-up from a laboratory procedure was readily achieved to 1,000 pounds of polyether per batch. Extensive evaluation of the polyethers for use in rigid urethane foams was made by appropriate formulation with polymeric isocyanates, with and without flame retardants, and with machine foaming. "Plant gate cost" of

the polyethers was estimated to be around 15 cents per pound, based on current raw material and plant operating costs. Fixed capital investment was estimated at \$375,000 for construction of a unit designed to produce 10,000,000 pounds of polyether a year. The low production cost of the new polyethers is expected to make them competitive with polyethers currently in use.

2058* • Wet- and Dry-Milled Corn Products as Feed Ingredients

C. W. BLESSIN

Proc. 17th Annual School for Feed Men, sponsored by University of Wisconsin and Wisconsin Feed, Seed & Farm Supply Association, at Madison, Wis. August 9-10, 1966, pp. 36-40.

The role of a variety of wet- and dry-milled corn products as feed ingredients is discussed,

and selected areas of research at the Northern Division are described.

2059 • Additive Linear Free-Energy Relationships in Reaction Kinetics of Amino Groups with α , β -Unsaturated Compounds

MENDEL FRIEDMAN and JOSEPH S. WALL

J. Org. Chem. 31(9): 2888-2894. September 1966

Reaction rates of nucleophilic additions of amino groups in amino acids and peptides to α , β -unsaturated compounds were studied as functions of structural variations in both reactants. The observed wide variations in rates are correlated by a linear free-energy equation, which includes parameters associated with polar and steric factors of both reactants. This equation has theoretical significance and should be of value for the calculation of predicted polar and steric factors and

reaction rates of a large number of compounds. Linear relationships were observed between reaction rates for a number of vinyl compounds and several physicochemical parameters inherent in structural features associated with these compounds. These relationships indicate that resonance stabilization of ground and transition states appears to be the main factor that governs relative electrophilic reactivities of α , β -unsaturated compounds.

2060 • Recent Progress in Dialdehyde Starch Technology

C. L. MEHLTRETTER

Die Stärke 18(7): 208-213. July 1966

Dialdehyde starch, once a laboratory curiosity, is now a full-fledged industrial chemical that can command a world market. The wealth of information on dialdehyde starch and its uses obtained during the past few years has been disclosed

mainly in patents and is not readily available to the average cereal or starch chemist. This review, therefore, brings together the patent literature from 1960 to 1966 and emphasizes various areas of dialdehyde starch technology.

2061 • Oxygen Concentration in Larval Hemolymph of the Japanese Beetle, *Popillia japonica*, Infected with *Bacillus popilliae*

B. A. WEINER, W. F. KWOLEK,¹ G. ST. JULIAN, H. H. HALL, and
R. W. JACKSON

(¹USDA Biometrical Serv., Peoria, Ill.)

J. Invertebrate Pathol. 8(3): 308-313. September 1966

A polarographic method for measuring dissolved oxygen was used to follow changes during development of "milky disease" in larvae of the Japanese beetle, *Popillia japonica*. The dissolved oxygen of hemolymph of apparently healthy third-instar larvae in one group analyzed was equivalent to 33.4 to 42.0% saturation of 0.25 M KCl (0.078 to 0.100 μ moles/ml. of hemolymph, 95% confidence limits). The concentration of oxygen was signifi-

cantly lower early in the infection when only vegetative cells of *Bacillus popilliae* were present in the hemolymph. When both vegetative and spore forms were present, the oxygen level approached that of the uninfected group. Infection was initiated by feeding spores at the rate of 1 to 10 million spores/gram of soil. At this level, 20% of the larvae became infected.

2062 • Aflatoxin Production and Degradation by *Aspergillus flavus* in 20-Liter Fermentors

A. CIEGLER, R. E. PETERSON, A. A. LAGODA, and H. H. HALL

Appl. Microbiol. 14(5): 826-833. September 1966

Yields off from 200 to 300 milligrams per liter of aflatoxins B₁ and G₁ were produced by two strains of *Aspergillus flavus* in 20-liter fermentors under proper conditions of inoculum (well-dispersed growth) and aeration (0.5 volume per volume per minute of air, 300 r.p.m., 30 p.s.i. back pressure, baffles). Peak yields were usually attained in 72 hours, after which the aflatoxin concentration declined rapidly. Degradation of aflatoxin depended primarily on mycelial lysis and high-aeration

conditions. Cultures previously reported not to degrade aflatoxin could be induced to do so under these conditions. The percentage and rate of toxin degradation were independent of toxin concentration and appeared to be nonenzymatic and nonspecific. Degradation simulating that occurring in the fermentor was achieved by reacting aflatoxin with peroxidized methyl esters of vegetable oil; initial degradation was rapid and appeared to involve a complex series of reactions.

2063 • Species of *Absidia* with Ovoid Sporangiospores. II.

J. J. ELLIS and C. W. HESSELTINE

Sabouraudia 5(1): 59-77. June 1966

The only species of the genus *Absidia* found in animals and man belong to *A. ramosa* and *A. corymbifera*. We have studied more than 150 isolates belonging to these two species. Although closely related, the two are distinguishable by the regularly elliptical to ovoid spores of *A. ramosa* and the irregularly ovoid to globose spores of *A. corymbifera*. A large number of synonyms exist for both species. Zygosporangia, illustrated for the first time for both heterothallic species, are produced when appropriate strains are mated on media, such as yeast extract agar, at an optimum temperature of 31° C. When two appropriate colo-

nies meet, zygosporangia are formed in a diffuse fashion throughout the aerial mycelium and are produced between two nearly parallel suspensors devoid of outgrowths. The zygosporangia are globose to slightly compressed and encircled by one or more ridges with the equatorial one most conspicuous. *Absidia aegyptiacum*, *A. capillata*, *A. dubia*, *A. robusta*, *A. tuneta*, *Lichtheimia sartoryi*, *Mycocladius hyalinus*, and *Tieghemella turkestanica* are described and discussed as little-known species. *Mucor muriperda* and *Tieghemella muriperda* proved to be synonyms of *Mucor pusillus*.

2064 • Crambe Seed Processing: Improved Feed Meal by Ammoniation

L. D. KIRK, G. C. MUSTAKAS, and E. L. GRIFFIN, JR.

J. Am. Oil Chemists' Soc. 43(9): 550-555. September 1966

An improved crambe meal has been developed by using an ammonia-heat treatment to give significantly better nutritive value and acceptability. The quantity of ammonia permanently bound as nitrogen in the processed meal was from 0.5 to 1.5% of the meal weight and varied with conditions of reaction. Destruction of the undesirable thioglucoside fraction of the meal was demonstrated by changes in paper chromatograms and by the absence of the thioglucoside conversion product,

thiooxazolidone. Ultraviolet-absorbing compounds in the meal, at least one of which is associated with bitterness, were also modified. Feeding experiments with chicks and cattle show an improved palatability and nutritional quality. Incorporation of the ammonia reaction into desolventizer-toaster operations should be possible to provide an economical means of improving the feeding value of crambe meal.

2065 • Selective Hydrogenation of Soybean Oil. II. Copper-Chromium Catalysts

S. KORITALA and H. J. DUTTON

J. Am. Oil Chemists' Soc. 43(9): 556-558. September 1966

Soybean oil was partially hydrogenated at 170° and 200° C. with 0.5 and 0.1% copper-chromium catalysts, respectively. The reaction proceeded selectively at both temperatures, although selectivity was better at the lower temperature. Both commercial and laboratory-prepared catalysts reduced the linolenic acid to less than 1% and with

selectivity ratios (K_{Le}/K_{Lo}) ranging from 6 to 13. Since stearate did not increase, linoleate selectivity (K_{Lo}/K_{Ol}) was extremely high. About 80% or more of the original linoleic acid remained in the hydrogenated products as measured by the alkali-isomerization method. More conjugated dienes were formed at 200° than at 170° C.

2066 • The *trans*-3-Enoic Acids of *Grindelia oxylepis* Seed Oil

R. KLEIMAN, F. R. EARLE, and I. A. WOLFF

Lipids 1(2): 301-304. September 1966

trans-3-Hexadecenoic acid (14%) and the previously unreported *trans*-3-octadecenoic acid (2%) have been identified in seed oil of *Grindelia*

oxylepis Greene, Compositae. Evidence also indicates the existence of other acids with *trans*-3-unsaturation.

2067 • Identification and Distribution of Epoxyacyl Groups in New, Natural Epoxy Oils

W. H. TALLENT, DIANA G. COPE, J. W. HAGEMANN, F. R. EARLE, and
I. A. WOLFF

Lipids 1(2): 335-340. September 1966

New high-epoxy vegetable oils have been investigated from nine species representing three plant families and four genera. The epoxyacyl moiety in at least one oil from each genus was characterized as the (+)-vernoloyl (*cis*-12,13-epoxy-*cis*-9-octadecenoyl) group. Intraglyceride distribution studies revealed a general preference of the (+)-vernoloyl groups for the β -position of

triglyceride molecules. In three oils interglyceride distribution of (+)-vernoloyl groups did not agree with predictions based on either 1,2,3-random or 1,3-random-2-random distribution. A striking exception to the general intraglyceride distribution pattern was discovered in the monoepoxy triglyceride fraction from *Euphorbia lagascae* seed oil.

2068 • Compositional Variation in Seed Oils of the *Crepis* Genus

F. R. EARLE, A. S. BARCLAY,¹ and I. A. WOLFF

(¹USDA Crops Research Div., Beltsville, Md.)

Lipids 1(2): 325-327. September 1966

Seed oils from eight species of the genus *Crepis* (family Compositae) fall into three groups differing in chemical composition. Besides conventional fatty acids the oils contain either vernolic acid (47-68%), crepenynic acid (36-65%), or

both (18-35% vernolic and 7-11% crepenynic). Among the limited groups of samples examined, the oils are chemically similar within any one section of the genus.

2069 • Microbial Polysaccharides--A Review

K. L. SMILEY

Food Technol. 20(9): 112-116. September 1966

Microbial polysaccharides can be roughly classified into two groups: homo- and heteropolysaccharides. In the first group are those produced from sucrose by a variety of bacteria, for example, such polymers as the dextrans. Historically, dextrans have been an economic problem because of their deleterious effects in sucrose refining. These

polymers are quite slimy and tend to clog filters and to interfere with crystallization of the sugar. Indeed, the action of the organisms producing dextran is so extensive in sugar processing that it can be detected in any crystalline sucrose preparation. Even most highly refined sucrose standards have trace amounts of dextran in them.

2070 • Identification of the Stimulatory Factors in Citrus Molasses for Carotenogenesis in *Blakeslea trispora*

ZDISLAW PAZOLA, ALEX CIEGLER, and HARLOW H. HALL
Nature 210(5043): 1367-1368. June 25, 1966

Citrus molasses and other citrus byproducts stimulate carotenogenesis by mated cultures of *Blakeslea trispora*. The active compound in the citrus materials was found to be sucrose and citric acid in combination. The function of the sucrose was other than an energy source. Two hypotheses were advanced to explain the data: (1) part of the

biosynthetic pathway of carotene synthesis may be under repressor control or (2) the biosynthetic pathway may become repressed in the presence of a readily metabolizable carbon source, such as glucose, that produces an "internal inducer-destroying enzyme."

2071 • Graft Copolymers of Starch. II. Copolymerization of Gelatinized Wheat Starch with Acrylonitrile: Influence of Reaction Conditions on Copolymer Composition

GEORGE F. FANTA, ROBERT C. BURR, C. R. RUSSELL, and C. E. RIST
Polymer Letters 4(10): 765-769. October 1966

The influence of changes in selected reaction conditions on both the molecular weight of grafted polyacrylonitrile and the grafting frequency was studied for the copolymerization of gelatinized wheat starch with acrylonitrile as initiated by ceric ammonium nitrate. No large changes in copolymer composition occurred when monomer and catalyst were added inversely, simultaneously, portionwise, or when monomer and starch were allowed to stand overnight before addition of the catalyst. A fivefold increase in catalyst

concentration likewise produced only minor changes in the structure of the copolymer. An increase in reaction temperature from 25° to 50° C. caused only a relatively small variation in copolymer composition; however at 2° C., an appreciable amount of extremely heavily grafted product was isolated. The absence of significant amount of ungrafted polyacrylonitrile in this fraction was indicated by the low conversion to polymer in a control reaction made under the same conditions but without starch.

2072 • Air Classification of Sorghum Flours from Varieties Representing Different Hardnesses

A. C. STRINGFELLOW and A. J. PEPLINSKI
Cereal Sci. Today 11(10): 438-440, 445. October 1966

Sorghum flours prepared by laboratory milling of known varieties respond to air classification in a manner similar to that for wheat flours. Representative sorghum varieties used were: Martin (hardest), Plainsman, Dwarf Yellow Milo, and Combine 7078 (softest). Relative hardness was

determined by a pearling method. Air classification showed that the softer varieties gave a higher fractionation response. Protein values for the separated fractions varied from 19 to 3.5%, and total protein shift varied from 40 to 20%.

2073 • Wheat Tempeh

HWA L. WANG and C. W. HESSELTINE

Cereal Chem. 43(5): 563-570. September 1966

Among the cultures tested, *Rhizopus oligosporus* NRRL 2710 gave the most satisfactory wheat tempeh, whereas such cultures as *R. oryzae* NRRL A-9847 and *R. arrhizus* NRRL 1526, known to make good soybean tempeh, proved unsuitable because of undesirable odor or poor growth. The yield of wheat tempeh by the procedures described approximated 84.5% (on a dry solid basis) after 20 hours of fermentation and 64.5% after 43 hours. Unlike soybean tempeh, wheat tempeh still smelled and tasted good even after 43 hours of incubation. As fermentation progressed, the pH of wheat fell from

6.8 to 5.7 and then gradually rose to 6.7, presumably because of protein breakdown. Soluble nitrogen and reducing substances increased steadily, whereas total nitrogen remained fairly constant. A proteolytic enzyme having optimal pH 5.5 is responsible for the breakdown of protein. Of the vitamins analyzed, the content of niacin and riboflavin of wheat tempeh greatly exceeded that of wheat; thiamine was less. This new fermented wheat product may provide vitamins, as well as calories and proteins, at low cost.

2074 • Polyacrylamide-Gel Electrophoresis of Soybean Whey Proteins and Trypsin Inhibitors

A. C. ELDRIDGE, R. L. ANDERSON, and W. J. WOLF

Arch. Biochem. Biophys. 115(3): 495-504. September 1966

Polyacrylamide-gel electrophoresis with glycine buffer (pH 9.2) containing 8 *M* urea separated soybean whey proteins into at least 24 bands. In contrast, ultracentrifugation indicated only 2 fractions; moving-boundary electrophoresis, 8-9 components; and column chromatography, 13 or more proteins. A prominent, fast-moving band in the gel pattern appeared to be identical to crystalline soybean trypsin inhibitor. Examination of 9 commercial samples of trypsin inhibitor showed multiple bands in all; most samples separated into 6 or more bands, and 1 preparation resolved into at least 13 bands in the gel. An inhibitor sample isolated by column chromatography and apparently

identical to crystalline inhibitor also appeared heterogeneous although it contained fewer minor bands than the commercial samples. Three other trypsin inhibitor fractions recently isolated by column chromatography likewise yielded multiple bands but distinctly different from crystalline soybean trypsin inhibitor.

Polyacrylamide-gel electrophoresis appears to be a sensitive tool for examining soybean whey protein fractions and should greatly facilitate future fractionation studies on this complex protein mixture.

2075 • Fungi in Flour and Refrigerated Dough Products

R. R. GRAVES and C. W. HESSELTINE

Mycopathol. Mycol. Appl. 29(3-4): 277-290. August 1966

Fungal counts of 19 flour samples and 11 wheat samples from 11 flour mills of the Kansas-Nebraska and Pacific Northwest wheat-growing areas were made over a period of 2 years. In addition, 50 spoiled and 22 fresh samples of refrigerated dough products were examined for their fungal content. Methods for counting fungi from flour and refrigerated dough were improved through the use of tetracycline as a bacterial inhibitor. Fungal counts ranged from 85 to 8,100 per gram in flour and from 90 to 1,400 in wheat. Generally, mold counts were higher in flour than in wheat. Judging from earlier reports, improved handling of wheat and better milling practices are gradually reducing fungal counts in commercial flours. More than 500 fungi were isolated from the flours and doughs and were

identified. Except for a few Fungi Imperfecti and Mucorales, the majority of the species from the flours belong in the genera *Aspergillus* and *Penicillium*. Not only do they belong to these genera, but to specific groups in each. In the genus *Aspergillus*, representative of *A. candidus*, *A. glaucus*, *A. flavus-oryzae*, and *A. versicolor* groups were the only ones present. In *Penicillium* the series commonly found were *P. cyclopium*, *P. citrinum*, and *P. urticae*, and the remaining species were scattered among various series. Fungal counts of both fresh and spoiled dough samples were comparatively low. Essentially, fungal flora of the doughs reflected flour microflora. Spoilage of dough products did not appear to be of fungal origin.

2076* • Determination of the Effect of Various Ions on the Structure and Dielectric Constant of Water and on the Helix-Coil Transition of Polymers

S. R. ERLANDER

Proc. Inter. Symp. Macromol. Chem., Prague, Czechoslovakia, August 30-September 4, 1965, 12 pp., P-583.

The solubility of starch and benzene in various aqueous salt solutions was investigated to determine the mechanism of denaturation and dispersion of polymers, such as proteins. Salts, like lithium, having A regions in their solvated ions decrease the solubility of benzene, whereas those with only B regions, like guanidinium, increase it.

Concentrated salts do not disperse polymers by binding themselves to various polar or nonpolar groups or by competing for hydrogen bonds. Rather, the dispersing or denaturation action is due to a change in the structure of the solvent medium (water) and to the imposing of an electrical field by the cation or anion.

2077 • Kinetics of Polysaccharide B-1459 Synthesis

R. A. MORAINÉ, S. P. ROGOVIN, and K. L. SMILEY

J. Ferment. Technol. (Hakko Kogaku Zasshi) 44(6): 311-312. June 1966

The polysaccharide produced by *Xanthomonas campestris* B-1459 is a water-soluble gum, having properties that make it commercially valuable.

The kinetics of polymer formation were determined in order to improve operating procedures and to lower production costs.

2078 • Publications and Patents of the Northern Utilization Research and Development Division, January-June 1966

North. Util. Res. Develop. Div.

U.S. Agr. Res. Serv., Unnumb. Pub., 44 pp. July 1966

2079 • Improved Determination of Calibration and Coincidence Correction Constants for Coulter Counters

L. H. PRINCEN

Rev. Sci. Instr. 37(10): 1416-1418. October 1966

Calibration of Coulter counter with a single latex suspension of narrow size distribution is inadequate, since mean particle size of such latexes is known to only 2% accuracy and since the distributions are much wider than given by their manufacturers. Instead, calibration should be done with more than one latex sample; preferably five or six should be used, and then the calculated constants should be averaged.

Coincidence occurs more frequently than given

by the correction equations in the Coulter counter manual. The coincidence phenomenon not only is a function of the aperture diameter and manometer volume, but also depends on the shape of the aperture and the wafer thickness. Therefore, the coincidence correction constant cannot be calculated from a simple mathematical expression but has to be determined experimentally. Although a method has been developed for this determination, it has to be carried out for each combination of aperture and manometer.

2080 • Diastereomeric 1-Cyano-2(*S*)-hydroxy-3,4-epithiobutanes from *epi*-Progoitrin of Crambe Seed

M. E. DAXENBICHLER, C. H. VanETTEN, and I. A. WOLFF

Chem. Commun. (15): 526-527. August 1966

The products from hydrolysis of *epi*-progoitrin by endogenous enzyme(s) in defatted crambe seed meal were further examined. When the product mixture was chromatographed on a column of modified dextrans, (*S*)-1-cyano-2-hydroxy-3-butene and the diastereomeric forms of 1-cyano-2(*S*)-hydroxy-3,4-epithiobutane were isolated. The unsaturated nitrile was previously obtained as a product from hydrolysis of isolated *epi*-progoitrin. The proposed structures for the two sulfur-containing nitriles

are based on elemental analyses; molecular weights; and ultraviolet, infrared, nuclear magnetic resonance, and optical rotatory dispersion measurements of the materials as isolated or after acetylation. Desulfurization of the acetate from either of the episulfide-containing nitriles gave the acetate of (*S*)-1-cyano-2-hydroxy-3-butene. To our knowledge, episulfides have not been previously isolated from natural sources.

2081 • *Streptomyces griseus* (Krainsky) Waksman and Henrici. A Taxonomic Study of Some Strains

A. J. LYONS, JR., and T. G. PRIDHAM

U.S. Dept. Agr., Tech. Bul. 1360, 31 pp., November 1966

To clarify the nature and relationships of the important antibiotic-producing Actinomycetes, taxonomic studies were made on a group of 53 streptomycete strains exhibiting the following basic characteristics: Spore chains that are straight to flexuous; sporulating aerial mycelium colored in tints and shades of yellowish gray (Olive-Buff, Ridgway); inability to darken peptone-iron agar or to form brown or black diffusible pigments; and ability to utilize D-xylose but not L-arabinose or L-rhamnose in a chemically defined agar medium. Strains studied include some with epithet labels, "*brasiliensis*", "*griseus*", "*streptomycini*", and "*vinaceus*" and some that reputedly produce keratinase, vitamin B₁₂, or one or

more of the following antibiotics: actinomycin complex, cycloheximide, rhodomycin, streptocin, and streptomycin. The basic characteristics of each strain were verified and the following additional characteristics determined: optimal temperature range; proteolytic activity, by six different methods; diastatic activity, by two methods; abilities to reduce nitrate; spore-wall ornamentation, by electron micrography; abilities to utilize six additional carbon compounds; sensitivity to lysozyme, by two methods; abilities to decompose L-tyrosine, xanthine, and hypoxanthine; and antibiotic activities. The results suggest that these strains comprise several subspecies of *Streptomyces griseus* (Krainsky) Waksman and Henrici.

2082 • Gas-Solid Chromatographic Separation of Atmospheric Gases on Activated Alumina

R. L. HOFFMANN, G. R. LIST, and C. D. EVANS

Nature 211(5052): 965. August 27, 1966

Oxygen, nitrogen, and carbon dioxide have been completely separated by gas-solid adsorption chromatography on a single 4 foot x 1/8 inch column of activated alumina at 0° C. Such separa-

tions can be easily performed on any gas chromatograph equipped with a thermal conductivity detector.

2083 • Analog-Computer Program for Resolution of Overlapping Distribution Curves

R. O. BUTTERFIELD, E. B. LANCASTER, and H. J. DUTTON

Separation Sci. 1(2-3): 329-337. 1966

A program to generate overlapping distribution functions was written for an analog computer. In this program, the position, width, amplitude, and skewing of each function can be varied to match experimental data. Component percentages

can be calculated from integral curves. Special features of the system are: Matching can be done rapidly by using an oscilloscope, only standard equipment is needed, and parameters of the distribution are related to potentiometer settings.

2084 • Validation of the Species *Pichia guilliermondii*

LYNFERD J. WICKERHAM

J. Bacteriol. 92(4): 1269. October 1966

The commonly occurring imperfect yeast known as *Candida guilliermondii* (Cast.) Lgn. et Guerra occurs in nature as sexually active and sexually inactive forms. Wickerham and Burton described

the sexual state in 1952. Now the perfect form has been named *Pichia guilliermondii* and validated with a Latin description. Strain NRRL Y-2075 has been designated as the type.

2085 • Rearrangement of Bis(o-thiocarbonyl) Disulphides

B. S. SHASHA, W. M. DOANE, C. R. RUSSELL, and C. E. RIST

Nature 211(5052): 965-966. August 27, 1966

Bis(o-thiocarbonyl) disulphide derivatives (xanthides) of 1,2-, 1,3-, 1,4-, 1,5-, and 1,6-dihydroxy alkanes were prepared, and their rearrangements in pyridine were investigated. The monoxanthides of 1,2-propanediol and 1,3-propanediol-2,2-dimethyl underwent rearrangement-fragmentation to yield equimolar quantities of the

parent diols, the corresponding thionocarbonates, carbon disulphide, and free sulphur. The monoxanthides of 1,4-butanediol, 1,5-pentanediol, and 1,6-hexanediol rearranged to give the corresponding S-alkyl xanthate esters, carbonyl sulphide, and free sulphur.

2086 • Paper Chromatographic Detection of Plant Phenols with Antimony Trichloride

D. J. SESSA and J. J. RACKIS

J. Chromatog. 23(3): 487-490. August 1966

Antimony trichloride spray reagent is used to detect naturally occurring phenolic compounds on paper chromatograms. The sensitivity to this spray and the colors developed are recorded for 30 compounds representing isoflavones, flavones,

flavanols, flavonols, flavanones, coumarins, phenolic esters, cinnamic acids, and benzoid acids. Soybean saponins and phenolic compounds can be distinguished from one another even though these may give similar colors after spraying.

2087 • Fractionation of Geometric Isomers of Methyl Linolenate by Argentation Countercurrent Distribution

C. R. SCHOLFIELD, R. O. BUTTERFIELD, and H. J. DUTTON

Anal. Chem. 38(12): 1694-1697. November 1966

Geometric isomers of methyl linolenate were fractionated by countercurrent distribution between 0.2 N AgNO₃ in 90% methanol and hexane. Infrared analyses, capillary gas chromatography, and oxidative cleavage of monoenes produced by partial reduction with hydrazine showed that these trienoic esters were partially separated into six classes:

(1) all-*trans*; (2) *trans,cis,trans*; (3) *trans,trans,cis* and *cis,trans,trans*; (4) *cis,cis,trans* and *trans,cis,cis*; (5) *cis,trans,cis*; and (6) all-*cis*. Positions of the various isomers of isomerized methyl linolenate on capillary gas chromatograms and 100% cyanoethyl silicone columns are included.

2088 • Simulation of Counter Double Current Distribution by Digital Computer

H. J. DUTTON, R. O. BUTTERFIELD, and A. ROTHSTEIN¹

(¹Bradley University, Peoria, Ill.)

Anal. Chem. 38(12): 1773-1775. November 1966

A digital computer is ideally suited to simulate the multiple-stage, countercurrent, batch extractions that comprise a counter double current distribution (CDCD) operation. Mathematical theory and a computer program have been developed to

describe the various modes of CDCD operation and to give a more comprehensive insight into the process. Applications of theory and simulation of experimental fractionations of fatty methyl esters are presented.

2089 • Report on Kernel Structure and Wet Milling of High Lysine Corn

R. J. DIMLER

Proc. High Lysine Corn Conf., sponsored by Purdue University and supported by the Corn Industries Research Foundation, in Lafayette, Ind., June 21-22, 1966, pp. 121-127; Am. Miller 94(12): 7-9, 13. December 1966

This article reviews studies of high-lysine corn at the Northern Division in two areas: (1) kernel structure as observed both by a light and an electron microscope and (2) application of a

bench-scale procedure to wet mill this new grain. The corn used for these studies was the *opaque-2* single-cross hybrid grown at Purdue University in 1965.

2090 • Soybean Trypsin Inhibitors: Their Inactivation During Meal Processing

J. J. RACKIS

Food Technol. 20(11): 102-104. November 1966

Trypsin inhibitor activity, represented by four known factors, is present in raw soybean meal and in several meal fractions. All trypsin inhibitors can be readily inactivated by steam heat. Increase in protein efficiency and destruction of the pancreatic hypertrophic factor parallel inactivation of the trypsin inhibitor activity brought about by steaming soy flakes at atmospheric pressure. At 100° C. only 15 minutes of steaming is required to gain maximum protein efficiency values and to inactivate trypsin inhibitors of either full-

fat or defatted soybean flakes of about 0.010 inch thickness. Trypsin inhibitor activity of whole soybeans is also readily destroyed by atmospheric pressure steaming for 20 minutes when the beans are tempered to about 25% moisture before steaming. Soybean whey solids, which include the whey proteins, account for at least 70% of the total trypsin inhibitor activity of raw soybean meal. Trypsin inhibitor activity is low in toasted soybean meal and in isolated protein commercially processed.

- 2091 • The Stability of Soybean Oil: Effect of Time and Temperature on Deodorization**
HELEN A. MOSER, PATRICIA C. COONEY, C. D. EVANS, and J. C. COWAN
J. Am. Oil Chemists' Soc. 43(11): 632-634. November 1966

A comparison of the flavor and oxidative stability of soybean oil deodorized at different temperatures for different periods of time was studied with laboratory-deodorized oils. Flavor and oxida-

tive tests were in good agreement and showed that some combinations of time and temperature of deodorization gave significantly more flavor-stable oils than others.

- 2092 • Species of *Absidia* with Ovoid Sporangiospores. I.**
C. W. HESSELTINE and J. J. ELLIS
Mycologia 58(5): 761-785. September-October 1966

The species of *Absidia*, except those with globose or cylindrical sporangiospores reported earlier, are described and include: *A. verticillata*, *A. hyalospora*, *A. blakesleeana*, *A. repens*, *A. parricida*, and a new species *A. zychae*. Although Part II of this series will describe the remaining species in this group, these additional forms are given in a key to all the species in Part I. Also included is the single species with cuneate-shaped

spores, *A. cuneospora*. In addition a new genus, *Chlamydoabsidia* and its single species, *C. padeni*, are described based upon an *Absidia*-like fungus possessing regularly dark-colored, septate spores on aerial stalks arising from the stolons. The zygospores are described for all the species except *C. padeni*, *A. hyalospora*, and *A. zychae*. One species, *C. parricida*, is parasitic on other mucors.

- 2093 • Use of Ethanol-Water Adsorbent Slurries in Coating of Thin-Layer Chromatographic Plates**
H. B. SINCLAIR and J. LEHRFELD
Chemist-Analyst 55(4): 117. October 1966

If glass plates are thoroughly cleaned in detergent and 10 to 50% (by volume) of ethanol in-

stead of water before silica gels are spread, then the plates may be used repeatedly.

- 2094 • Isolation and Partial Characterization of Wheat γ -Gliadin**
J. H. WOYCHIK and F. R. HUEBNER
Biochim. Biophys. Acta 127(1): 88-93. September 1966

The γ -gliadin component of the gluten protein from Ponca wheat flour was isolated and its properties were investigated. The γ -gliadin was separated from the whole gliadin complex and then purified by a combination of ion-exchange chromatography and continuous-flow paper-curtain elec-

trophoresis. Even after reduction and alkylation of its disulfide bonds, γ -gliadin remained a single electrophoretic component and its molecular weight measured by ultracentrifugation was unaltered. End-group analysis indicated that it consists of a single polypeptide chain.

2095 • Effect of Synthetic Chelates on the Autoxidation of Unsaturated Fatty Acid Esters

GIOVANNI JACINI,¹ ENZO FEDELI,¹ and WILBUR C. SCHAEFER

(¹Experiment Station for Oils and Fats, Milan, Italy)

J. Agr. Food Chem. 14(6): 650-653. November-December 1966

Metals of the first transition series were chelated with Schiff bases from salicylaldehyde and ethylenediamine (I) and from salicylaldehyde and 1,3-propylene diamines substituted in position 2 with various fatty chains (II). Both types of chelates catalyze the autoxidation of unsaturated fatty acid esters to varying degrees according to the metal constituent. Chelates of type I are sparing-

ly soluble in fats and necessitate studies on heterogeneous systems. Chelates of type II, which are highly fat-soluble, are about 10 times as active as type I; activity of type II differs with substituted fatty chains, as well as with metal constituents. Among the chelates studied, those with oleic chains were the most active; Zn^{II} chelates were not autocatalytic.

2096 • Carbon and Nitrogen Utilization by *Rhizopus oligosporus*

W. G. SORENSON and C. W. HESSELTINE

Mycologia 58(5): 681-689. September-October 1966

Utilization of various carbon and nitrogen compounds by *Rhizopus oligosporus* Saito NRRL 2710 was investigated. Principle components of the soluble carbohydrates of soybeans, i.e., stachyose, raffinose, and sucrose, were not utilized as sole sources of carbon. Such common sugars as glucose, fructose, galactose, and maltose supported excellent growth, as did xylose. Various vegetable oils could be substituted for sugars as sources of carbon to give excellent growth.

Ammonium salts and such amino acids as proline, glycine, aspartic acid, and leucine were excellent sources of nitrogen. Other amino acids were less suitable, and tryptophan supported no growth at all. Sodium nitrate was not utilized as the sole source of nitrogen.

Experiments with citrate-buffered media demonstrated that *R. oligosporus* grows well at a pH as low as 2.6-3.0.

2097 • Seed Lipids

IVAN A. WOLFF

Science 154(3753): 1140-1149. December 2, 1966

This review emphasizes the chemical diversity of seed oils. Pertinent examples are provided to illustrate the excellent progress made in the last

decade in identifying new, naturally occurring, fatty acids and in elucidating details of molecular structures of triglycerides.

2098 • Xanthation of Starch in Low-Concentration Pastes

E. B. LANCASTER, L. T. BLACK, H. F. CONWAY, and E. L. GRIFFIN, JR.
 Ind. Eng. Chem., Prod. Res. Develop. 5(4): 354-356. December 1966

Xanthates of starch can be formed in good yields by mixing carbon disulfide with an alkaline 10% starch paste when the amount of xanthate required did not exceed about 0.12 mole per repeat-

ing unit. The rate of xanthation increases with temperature and with salt and alkali concentration. The method is readily adaptable to a continuous low-cost process.

2099 • Color Stability of Films from Conventional and Emulsion Paints Containing Linseed Oil

GEORGE E. McMANIS, L. E. GAST, and JOHN C. COWAN
 J. Paint Technol. 38(503): 740-745. December 1966

Emulsion paints were prepared from five different bodied linseed oils. After being stored in three locations, films from these paints were observed for color and color stability. These films were significantly whiter than films from oil-based paints and, under certain conditions, were as white as latex paint films.

Chemicals in the formulations of linseed oil emulsion paints and of flat oil-based paint affected color and color stability of films from them. These effects are related to type of paint, concentration of chemicals, and storage conditions.

2100 • Power-Law Rheology of Alkaline Starch Pastes

E. B. LANCASTER, H. F. CONWAY, and F. SCHWAB
 Cereal Chem. 43(6): 637-643. November 1966

Starch pastes containing from 5 to 10% starch and various amounts of sodium hydroxide (alkali) were prepared by different cooking procedures. The viscosities of the pastes were measured at temperatures up to 71° C. in an amylograph and at various speeds by a Brookfield viscometer. Data followed the power law fairly well, and the pa-

rameters of this model were calculated for selected starch pastes with and without alkali. The proportionality constant was related to the yield stress, which was not negligible. The pseudoplasticity constant was nearly independent of conditions and equal to about 0.7.

2101 • Enzymatic Production of Glucose Syrup from Grains and Its Use in Fermentations

M. C. CADMUS, L. G. JAYKO, D. E. HENSLEY, HELEN GASDORF, and
K. L. SMILEY

Cereal Chem. 43(6): 658-669. November 1966

Starch in ground samples of whole corn, wheat, and sorghum was enzymatically converted to D-glucose in 90 to 95% yield with a combination of α -amylase from either barley malt or *Bacillus subtilis* and glucoamylase from *Aspergillus* species. Gas-liquid chromatography of the trimethylsilyl derivatives of the syrup showed that maltose and isomaltose comprised less than 10% of the total sugar. Syrups containing 20 to 25% D-glucose were produced in 24 to 48 hours. Approximately 20 to 25% of the original grain solids were recovered by filtration after enzymolysis. Nitrogen in the recovered solids was about three

times higher than in the original grain. Some nitrogen was solubilized during enzymolysis and appeared in the syrups at a concentration of approximately 2 mg./ml. Two of the three strains studied, *A. awamori* NRRL 3112 and *A. niger* NRRL 3122, were the most efficient in total starch-to-glucose conversion, and were low in transglucosidase activity. The syrups were used to produce several microbial polysaccharides, citric acid, fumaric acid, and 2-ketogluconic acid. Product yields equal to, or surpassing, those with commercial D-glucose were realized.

2102 • Kinetics of Acid Modification: Starch and Wheat Flour

E. B. LANCASTER, K. J. MOULTON, and H. F. CONWAY

Cereal Chem. 43(6): 689-695. November 1966

Wheat flour and corn starch were acid-modified by contacting them with gaseous hydrogen chloride. The kinetics of modification was determined by following the change with time of the viscosity of a paste prepared from the neutralized flour or starch. Isotherms for the specific rates at 90° and 110° F. were determined for acid concentrations from 1.5 to 20 grams of HCl/kg. of solids

(moisture-free basis). The correlation $(1/E - 1) = 7.4 P^{0.64}$ corrected the specific rates over a wide range of substrate with both wet and dry HCl modification. In this relationship E is the ratio between the amount of acid required to achieve a given reaction rate with starch to that required to give an equal rate for a flour containing P grams of protein per gram of starch.

2103 • Reduction and Reoxidation of Wheat Glutenin

A. C. BECKWITH and J. S. WALL

Biochim. Biophys. Acta 130(1): 155-162. November 1966

The nature of disulfide bonds in wheat glutenin and the factors that influence their formation were investigated by reducing and reoxidizing them under various conditions. The presence in glutenin of intramolecular disulfide bonds, as well as intermolecular, is indicated by a small viscosity increase that follows the large viscosity drop during glutenin reduction. Reoxidation of reduced glutenin in dilute solutions gave a low-molecular-weight product. Its formation indicated intramolecular disulfide bonds only. Reoxidation of reduced glutenin proceeded more slowly than that

of reduced gliadin, which in a native state has primarily intramolecular disulfide bonds. Gliadin and glutenin may differ in polypeptide chain structure as demonstrated by starch-gel electrophoresis patterns of the reoxidized proteins. Reoxidation of reduced glutenin at 5% concentration gave a product that approached native glutenin in viscosity, molecular weight, and elasticity. Reoxidation either at higher concentrations or in urea yielded insoluble products. Appropriate ratios of intra- and intermolecular disulfide bonds are essential for viscoelastic properties of glutenin.

2104 • Kinetics of Polysaccharide B-1459 Fermentation

R. A. MORAINÉ and S. P. ROGOVIN

Biotechnol. Bioeng. 8(4): 511-524. November 1966

Polysaccharide gum was made by fermentation with *Xanthomonas campestris* NRRL B-1459 in a medium of glucose, minerals, and distillers' solubles. The effect of distillers' solubles on growth rate can be described by the familiar saturation equation. Although a quasistoichiometric relationship was observed between nitrogen utilization and growth, total nitrogen supply was not growth limiting, nor was polymer formation growth as-

sociated. Cell growth primarily took place in the early part of the fermentation; polysaccharide biosynthesis occurred throughout the fermentation. Glucose was converted to polysaccharide at a fairly constant yield, which was 70 to 80% of glucose consumed, under optimum conditions. The kinetic patterns observed indicate that multi-stage continuous fermentation will be suitable for polysaccharide production.

2105 • Microbial Detoxification of Aflatoxin

A. CIEGLER, E. B. LILLEHOJ, R. E. PETERSON, and H. H. HALL

Appl. Microbiol. 14(6): 934-939. November 1966

Yeasts, molds, bacteria, actinomycetes, algae, and fungal spores were screened for their ability to degrade aflatoxin. Some molds and mold spores partially transformed aflatoxin B₁ to new fluorescing compounds. Only one of the bacteria, *Flavobacterium (aurantiacum?)* NRRL B-184, removed aflatoxin from solution. Both growing and resting cells of B-184 took up toxin irreversibly. Toxin-

contaminated milk, oil, peanut butter, peanuts, and corn were completely detoxified, and contaminated soybeans were partially detoxified by addition of B-184. Duckling assays showed that detoxification of aflatoxin solutions by B-184 was complete, with no new toxic products being formed.

2106 • Gas-Solid Chromatography of Hydrocarbons on Activated Alumina. II. Alkane, Alkene, Alkyne Separations and Subtractive Adsorption

R. L. HOFFMANN, G. R. LIST, and C. D. EVANS

J. Am. Oil Chemists' Soc. 43(12): 675-677. December 1966

Various alkanes, -enes, and -ynes of molecular weights below C₁₀ are rapidly separated by gas-solid adsorption chromatography on untreated activated alumina. Solid silver nitrate coated on alumina removes alkenes and alkynes through oxidative degradation. Silver-nitrate concentration

and column temperature markedly affect olefin removal. At about 300° C. some of the C₈ and higher molecular weight saturated hydrocarbons are destroyed. Conditions for this subtractive chromatography are detailed, and the fate of unsaturated hydrocarbons is explained.

2108 • Aflatoxin Formation by *Aspergillus flavus*

C. W. HESSELTINE, O. L. SHOTWELL, J. J. ELLIS, and R. D. STUBBLEFIELD
 Bacteriol. Rev. 30(4): 795-805. December 1966

Aflatoxin can be produced by *Aspergillus flavus* either on solid or liquid media (still or shaken) with potato dextrose. Aflatoxin is found in culture filtrates, mycelium, and the spores. Examination indicates that certain strains, e.g., NRRL 482, do not produce aflatoxin, whereas others vary greatly in the amounts formed. Aflatoxin appears as early as 48 hours, but maximum yields are usually obtained in fermentation liquors in 5 days. Often amounts in culture liquors decrease rapidly after 5 days. Associated with toxin formation is a drop in pH to 3 in the case of some of the best producers, such as NRRL 2999 and NRRL 3000.

Out of 52 strains of *Aspergillus oryzae*, obtained from pure culture starters used in the manufacture of shoyu, miso, and black beans, 37

produced fluorescent material, but there was no evidence that the fluorescing substances were aflatoxin. A number of good food samples were examined, including miso, shoyu, and various types of tempeh. Although all had a great deal of fluorescent material, none contained aflatoxin at levels detectable by methods used.

Rice, peanuts, wheat, corn, soybeans, and sorghum were studied as substrates for aflatoxin production, both in still and in shaken culture. Yields of aflatoxin depended largely on the substrate used. Rice was an excellent substrate, but little aflatoxin was produced when soybeans were. All four types of aflatoxin can be produced readily by a strain such as NRRL 2999 on rice, sorghum, corn, wheat, or peanuts in 5 days at 28° C.

2109 • Automatic Gas Pressure Controller and Volume Recorder

WILLIAM K. ROHWEDDER

Rev. Sci. Instr. 37(12): 1734. December 1966

An automatic gas-pressure controller and volume recorder have been built for use at atmospheric pressure with a precision hydrogenator. An interchangeable stainless steel cylinder (10 to 300 cc.) is mounted on a miniature lathe bed with the

piston mounted on the lathe carriage and the lead screw driven by a servomotor. A linear displacement potentiometer connected to the piston provides a signal proportional to the cylinder volume.

2110 • Full-Fat Soybean Flours by Continuous Extrusion Cooking

GUS C. MUSTAKAS, EDWARD L. GRIFFIN, JR., and VIRGIL E. SOHNS

In "World Protein Resources," ed. Robert F. Gould, a symposium sponsored by the division of Agricultural and Food Chemistry, American Chemical Society, Atlantic City, N. J., September 13-15, 1965, Advan. Chem. Ser. 57: 101-108 (1966).

Extrusion processing, a method continuing to find new and wider applications in the food industry, is adaptable to the production of full-fat soybean flour, and can produce an edible flour of good flavor, oxidative stability, and high nutritional value. Experimentally produced flours were evaluated by chemical analyses, biological assays, available lysine content, vitamin assays,

organoleptic tests, oxidative-stability storage tests, and clinical testing with infants up to 12 months old. The future potential of this process for soybeans seems promising, owing to unique characteristics which lend themselves to modern high-production, low-cost techniques that can yield a high-quality product.

REPUBLICATION

2032 • **Facteurs Cles et Progres Recents dans la Stabilite de Flaveur de L'Huile de Soja**

J. C. COWAN

Rev. Franc. Corps Gras 13(8-9): 515-524. August-September 1966

This translated address on "Key Factors and Recent Advances in the Flavor Stability of Soybean Oil" was given for members of the Institu

des Corps Gras, Paris, France, May 18, 1966. It has been published in English in the Journal of the American Oil Chemists' Society for July 1966.

CONTRACT AND GRANT RESEARCH PUBLICATIONS

[Report of research work done by an outside agency under contract with the U.S. Department of Agriculture and supervised by the Northern Utilization Research and Development Division.]

169-C • **The V Amylose-Water System: Enthalpy of Hydration on the Helix Exterior**

P. C. NICOLSON, G. U. YUEN, and B. ZASLOW

Arizona State University, Tempe

Biopolymers 4(6): 677-682. July 1966

170-C • **Preparation and Polymerization of Some Vinyl Ester Amides of Pinic Acid**

J. H. GRIFFITH,¹ C. S. MARVEL,¹ G. W. HEDRICK,² and FRANK MAGNE³

¹University of Arizona, Tucson; ²USDA Naval Stores, Olustee, Fla.; ³South. Util. Res. Develop. Div., New Orleans, La.

J. Polymer Sci., Part A-1, 4(8): 1993-2002. August 1966

172-C • **Amino Derivatives of Starches. Sulfonation Studies on Methyl 3,6-Anhydro- α -D-glucopyranoside and Related Derivatives**

M. L. WOLFRAM, YEN-LUNG HUNG, P. CHAKRAVARTY, G. U. YUEN, and D. HORTON

The Ohio State University, Columbus

J. Org. Chem. 31(7): 2227-2232. July 1966

173-C • **Amino Derivatives of Starches. 2-Amino-3,6-anhydro-2-deoxy-D-mannose**

M. L. WOLFRAM, P. CHAKRAVARTY, and D. HORTON

The Ohio State University, Columbus

J. Org. Chem. 31(8): 2502-2504. August 1966

[Report of research work done by an outside agency under a grant from the U.S. Department of Agriculture and supervised by the Northern Utilization Research and Development Division.]

- 8-G • **Synthesis and Reactions of Unsaturated Sugars. Unsaturated Sugars Through Thionocarbonate Intermediates and Synthesis of a 5-Deoxy-6-thiohexose System**
D. HORTON and W. N. TURNER
The Ohio State University, Columbus
Carbohydrate Res. 1(6): 444-454. March 1966
- 9-G • **Starch Acetals. O-Tetrahydropyran-2-yl and O-(1-Alkoxyethyl) Derivatives of Starch**
M. L. WOLFROM, S. S. BHATTACHARJEE, and G. G. PAREKH
The Ohio State University, Columbus
Die Stärke 18(5): 131-135. May 1966
- 10-G * • **A Ring Closure of Methyl α -(2,4-Dinitrophenylamino)acrylate**
A. E. LUETZOW, N. E. HOFFMAN, and J. R. VERCELLOTTI
Marquette University, Milwaukee, Wis.
Chem. Commun. (10): 301-302. May 1966
- 11-G • **Acid-Catalysed Degradation of D-Glucal and Its Triacetate**
D. HORTON and TSUTOMU TSUCHIYA
The Ohio State University, Columbus
Chem. Ind. (London) (48): 2011-2012. November 26, 1966
- 12-G • **A Novel Method for the Action Patterns and the Differentiation of α -1,4-Glucan Hydrolases**
JOHN H. PAZUR and SHIGETAKA OKADA
University of Nebraska, Lincoln
J. Biol. Chem. 241(18): 4146-4151. September 1966.

[Report of research work supported with funds provided by the U.S. Department of Agriculture under the authority of U.S. Public Law 480, 83rd Congress, and sponsored by the Northern Utilization Research and Development Division.]

- 109-F *** **Protection of Unsaturation During Heterogeneous Catalytic Hydrogenation of Aliphatic Epoxy to Hydroxy Groups**
 R. SUBBARAO, G. VENKATESWARA RAO, and K. T. ACHAYA
 Regional Research Laboratory, Hyderabad, India
 Tetrahedron Letters (4): 379-381. January 1966
- 110-F • The Enzymatic Breakdown of Soybean Saponins in the Digestive Tract of Chicks, Rats, and Mice**
 B. GESTETNER, YEHUDITH BIRK, and A. BONDI
 The Hebrew University of Jerusalem, Rehovoth, Israel
 Israel J. Chem. 3(4a): 88. February 1966
- 111-F • Determination of Water in Carbohydrates by an Infrared Spectrophotometric Method**
 B. CASU, G. GAGLIOPPA, and M. REGGIANI
 Scientific Institute of Chemistry and Biochemistry, Milan, Italy
 Die Stärke 17(12): 386-389. December 1965
- 112-F • Electrophorese de la Zeine sur Gel d'Amidon [Electrophoresis of Zein on Starch Gel]**
 JACQUES LANDRY and MARC SALLANTIN
 Central Station of Plant Physiology, National Institute of Agronomic Research, Versailles, France
 Compt. Rend. 262(1): 156-159. January 1966
- 113-F • Fractionnement de la Zéïne par Chromatographi sur Sephadex [Fractionation of Zein by Chromatography Using Sephadex]**
 JACQUES LANDRY
 Central Station of Plant Physiology, National Institute of Agronomic Research, Versailles, France
 Compt. Rend. 261(14): 2775-2778. October 1965
- 114-F • Studies on Flavor Components in Soybean. Part II. Phenolic Acids in Defatted Soybean Flour**
 SOICHI ARAI, HIDEKI SUZUKI, MASAO FUJIMAKI, and YOSITO SAKURAI
 The University of Tokyo, Tokyo, Japan
 Agr. Biol. Chem. (Tokyo) 30(4): 364-369. April 1966

- 115-F • Variations of 2-Ketogluconate and 5-Ketogluconate Oxidoreductases During Growth in *Acetobacter suboxydans***
E. GALANTE, G. A. LANZANI, and P. SEQUI
University of Milan, Milan, Italy
Enzymologia 30(4): 257-264. April 1966
- 116-F • The Iodine Affinity of Some Kinds of Starch**
J. ELIASSAF and JANINE BEL AYCHE
Institute for Fibres and Forest Products Research
Ministry of Commerce and Industry, Jerusalem, Israel
Die Stärke 17(12): 389-390. December 1965
- 117-F • The Structure of Triglycerides in Selected Oils Containing Erucic Acid**
H. GRYNBERG and H. SZCZEPANSKA
Institute of General Chemistry, Warsaw, Poland
J. Am. Oil Chemists' Soc. 43(3): 151-152. March 1966
- 118-F • Effect of Moisture Content & Grinding Principle on Fragmentation of Wheat Endosperm**
N. S. KENT
Research Association of British Flour-Millers, St. Albans, Herts., England
Cereal Sci. Today 11(3): 91-93, 119. March 1966
- 119-F^{*} • Elementos Trazas en Grasas Comestibles. XII. Nuevos Ensayos sobre "Desmetalizacion" de Aceites de Soja [Trace Elements in Edible Oils. XII. New Tests on "Demetalization" of Soybean Oil]**
A. VIOQUE, R. GUTIERREZ, M. A. ALBI, and M. NOSTI
Institute of Fats and Their Derivatives, Seville, Spain
Grasas Aceites (Seville, Spain) 16(6): 269-277. November-December 1965
- 120-F • The Fractionation of Pullulanase on Sephadex G-200**
B. MAY FRANTZ, E. Y. C. LEE, and W. J. WHELAN
Royal Free Hospital School of Medicine, London, England
Biochem. J. 100(1): 7-8P. July 1966
- 121-F • Studi sul Destrano e Derivati del Destrano. Nota VIII. Cristallinita nel Destrano e Suoi Prodotti di Degradazione [Studies on Dextran and Dextran Derivatives. Note VIII. Crystallinity of Dextran and Its Degradation Products]**
FRANCESCO A. GIANTURCO and PAOLO CERLETTI
University of Rome, Rome, Italy
Gazz. Chim. Ital. 96(5): 574-577. May 1966

- 122-F • Über die Wachstumsfaktoren der "Distiller's Dried Solubles" [Growth Factors of "Distillers' Dried Solubles"]**
 ALFREDO DANSI, ALMA DAL POZZO, CESARE ZANINI, ELENA MENEHINI,
 and ADRIANO CRAVERI
 Scientific Institute of Chemistry and Biochemistry, Milan, Italy
 Ann. Chem. 695: 226-229. July 1966
- 123-F • Studi sul Destrano e Derivati del Destrano. Nota VII. Spettroscopia Infrarossa di Destrano Nativo e Destrano Clinico [Studies on Dextran and Dextran Derivatives. Note VII. Infrared Spectroscopy of Native and Clinical Dextrans]**
 FRANCESCO A. GIANTURCO, PAOLO CERLETTI, and PAOLA TURINI
 University of Rome, Rome, Italy
 Gazz. Chim. Ital. 96(5): 566-573. May 1966
- 124-F • The Isolation of Cereal Starches in the Laboratory**
 G. K. ADKINS and C. T. GREENWOOD
 University of Edinburgh, Edinburgh, Scotland
 Die Stärke 18(7): 213-218. July 1966
- 125-F • Peptide Cross-Links in Bacterial Cell Wall Peptidoglycans Studied with Specific Endopeptidases from *Streptomyces albus* G**
 JEAN-FRANCOIS PETIT, EMILIO MUNOZ and JEAN-MARIE GHUYSEN
 University of Liege, Liege, Belgium
 Biochemistry 5(8): 2764-2776. August 1966
- 126-F • Hydrogen Bonding and Conformation of Glucose and Polyglucoses in Dimethylsulphoxide Solution**
 B. CASU¹, M. REGGIANI¹, G. G. GALLO², and A. VIGEVANI²
¹Scientific Institute of Chemistry and Biochemistry, Milan, Italy
²Lepetit Research Laboratories, Milan, Italy
 Tetrahedron 22(9): 3061-3083. September 1966
- 127-F • Soya Bean Saponins--VI. Composition of Carbohydrate and Aglycone Moieties of Soya Bean Saponin Extract and of Its Fractions**
 B. GESTETNER, YEHUDITH BIRK, and A. BONDI
 The Hebrew University of Jerusalem, Rehovoth, Israel
 Phytochemistry 5(4): 799-802. July 1966
- 128-F • Soya Bean Saponins--VII. A Method for the Determination of Sapogenin and Saponin Contents in Soya Beans**
 B. GESTETNER, YEHUDITH BIRK, A. BONDI, and Y. TENCER
 The Hebrew University of Jerusalem, Rehovoth, Israel
 Phytochemistry 5(4): 803-806. July 1966

- 129-F • Recenti Contributi alla Conoscenza della Struttura dell'Amilosio e delle Ciclodestrine [Recent Contributions to the Knowledge of Amylose and Cyclodextrins Structure]**
 BENITO CASU
 Scientific Institute of Chemistry and Biochemistry, Milan, Italy
 Chim. Ind. (Milan) 48(9): 921-930. September 1966
- 131-F • Importance of Moisture and Pressure in the Milling of Flour for Air Classification**
 N. L. KENT
 Research Association of British Flour-Millers, St. Albans, Herts., England
 Northwest. Miller 273(4): 30,32,34,36,38,39. April 1966
- 132-F • Studies on Dextran and Dextran Derivatives. X. The Interaction of Dextran Sulfate with Lysozyme**
 EMILIA CHIANCONE, M. ROSARIA BRUZZESI, and ERALDO ANTONINI
 University of Rome, Rome, Italy
 Biochemistry 5(9): 2823-2828. September 1966
- 133-F • Soybean Hemagglutinin, a Plant Glycoprotein. I. Isolation of a Glycopeptide.**
 HALINA LIS, NATHAN SHARON, and EPHRAIM KATCHALSKI
 The Weizmann Institute of Science, Rehovoth, Israel
 J. Biol. Chem. 241(3): 684-689. February 1966
- 134-F • The Interaction of Starch with Bromine in Acid Solution**
 J. ELIASSAF and JANINE BEL AYCHE
 Institute of Fibres and Forest Products Research
 Ministry of Commerce and Industry, Jerusalem, Israel
 Israel J. Chem. 4(1a): 94p. October 1966
- 135-F • Conformation of Amylose and Its Derived Products. I. Infrared Spectra of Amylose and Its Oligomers in the Amorphous Solid Phase and in Solution**
 B. CASU and M. REGGIANI
 Scientific Institute of Chemistry and Biochemistry, Milan, Italy.
 Die Stärke 18(7): 218-229. July 1966
- 136-F • Soybean Oligosaccharides. Isolation by Gel Filtration and Identification by Acetylation**
 TADASI KASAI and SIN'ITIRO KAWAMURA
 Kagawa University, Takamatsu, Japan
 Tech. Bull. Fac. Agr., Kagawa Univ. (Kagawa Daigaku Nogakubu Gakuzyutu Hokoku) 18(1): 9-15. October 1966

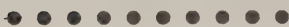
- 137-F • Studies on Cause of Color Reversion of Edible Soybean Oil and Its Prevention.
Part I. Relation between the Moisture of Soybeans and the Quantity of Tocopherol
in Them

MAMORU KOMODA, NORIJI ŌNUKI and ICHIRO HARADA

Sugiyama Chemical Research Institute, Tokyo, Japan

Agr. Biol. Chem. (Tokyo) 30(9): 906-912. September 1966

July — December 1966



PATENTS

[These patents are assigned to the Secretary of Agriculture. Copies of patents may be purchased (50 cents each) from the Commissioner of Patents, U.S. Patent Office, Washington, D.C. 20231. Order by number, do not send stamps.]

Multiple Hydrogenation Insert

ROGER A. EISENHAUER and ROBERT E. BEAL
U. S. Patent 3,261,669. July 19, 1966

An insert assembly for permitting commercial tubular hydrogenation vessels to be used for a multiplicity of simultaneous semimicro reactions, this insert assembly comprising a series of engagingly threaded rod-like segments each drilled out from one end so as to form a semimicro-reaction chamber, each semimicro chamber having

access to a surrounding pressurized gas through a small hole drilled through the wall at which point there has been welded a short piece of inwardly directed tubing that prevents loss of sample during rocking of the surrounding commercial reaction vessel.

Method of Preparing Edible Soybean Characterized by Greatly Enhanced Water Absorption

GUS C. MUSTAKAS and EDWARD L. GRIFFIN, JR.
U.S. Patent 3,268,503. August 23, 1966

A continuous commercial process for preparing an edible, debittered soybean protein product characterized by the ability to absorb about 3.5 to about 4 times its weight of water despite the presence of extensive to substantially complete denaturation, said process comprising the steps of slurring defatted soybean flakes at room temperature in a 50 to 70% aqueous solution of an alcohol selected from the group consisting of

methanol, ethanol, and isopropanol, draining the alcohol from the flakes to provide a wet marc, fluidizing and desolventizing the marc for 7 to 9 seconds at about 375° F. in an indirectly heated carbon dioxide-containing recycle vapor stream having a velocity of about 60 to 75 feet per second, recovering the fluidized flakes, and cooling them in a stream of air.

Carbohydrate-Derived Polymers of Acrylonitrile

WILLIAM A. P. BLACK, ERIC T. DEWAR, and DAVID RUTHERFORD
U.S. Patent 3,275,582. September 27, 1966

Additional carbohydrate-derived polymers analogous to those of U.S. Patent 3,225,012 are a copolymer consisting of about 98 mole percent of

acrylonitrile and about 2 mole percent of 3-*O*-allyl-diisopropylideneglucofuranose and the acid-deacetonated derivative of the said copolymer.

Production of Methyl 6-Chloro-6-deoxy- α -D-glucopyranoside

HENRY B. SINCLAIR

U.S. Patent 3,280,103. October 18, 1966

A fourfold improvement in yield of halogenated hexoses, such as methyl 6-chloro-6 deoxy- α -D-glucopyranoside, is achieved by subjecting a solution of methyl glucoside in dimethylformamide to reaction with sulfur monochloride, adding water to hydrolyze excess sulfur monochloride, filtering through kieselguhr, adjusting the pH to about 8.0,

concentrating the solution, refiltering, placing the filtrate on a column of activated charcoal, and respectively eluting the inorganic salts, unreacted methyl glucoside, and the halogenated hexose by washing the column in succession with water, 5% ethanol, and 12% ethanol.

Production of 2-Ketogluconic Acid by *Serratia marcescens*

THERESSA J. MISENHEIMER

U.S. Patent 3,282,795. November 1, 1966

Substantially theoretical yields of 2-ketogluconic acid in the form of the calcium salt are reached in a 16-hour serrated fermentation of *Serratia*

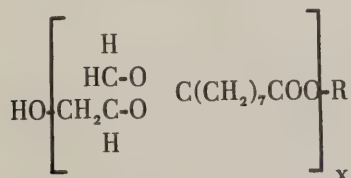
marcescens NRRL B-486 in a buffered medium containing 11 to 12% glucose along with sources of nitrogen and trace metals, plus 3% CaCO₃.

Glycerol Derivatives of Azelaaldehydic Acid and Poly(ester-acetals) Therefrom

WILLIAM R. MILLER, JOHN C. COWAN, and EVERETT H. PRYDE

U.S. Patent 3,285,880. November 15, 1966

The novel compound isopropylideneglyceryl azelaaldehyde dimethyl acetal undergoes hydrolysis polymerization in the presence of organic solvent and mineral acid to form a poly (ester-acetal) having the structure



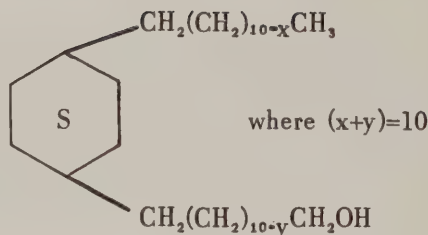
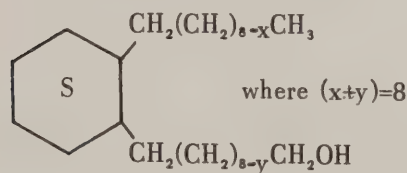
where R is H or Na and x is an integer from 4 to 7, which poly(ester-acetal) can be further polymerized, crosslinked, or both.

Also, the monomeric glyceryl 1,2-acetal of methyl azelaaldehyde upon prolonged heating at 160° to 260° C. under vacuum and in the presence of CaO catalyst forms a crystalline polyester having a molecular weight of 6,000 and a melting point of 61.5° to 62.5° C.

Nonsticky Aluminum-Containing Antiperspirant

FRED C. THEILE and PETER SGARAMELLA
U.S. Patent 3,287,223. November 22, 1966

The objectionable feelings of stickiness and tackiness that ordinarily are sensed with antiperspirant compositions that contain aluminum compounds such as the oxychloride are prevented by substituting for a conventional higher aliphatic alcohol about 4% based on the composition of the C_{18} or C_{20} saturated cyclic alcohol isomers corresponding respectively to the following formulas:



This patent from Shulton, Inc., Clifton, N. J., was assigned to the Secretary of Agriculture, because of cooperative work with the Northern Division.

Glycerol Derivatives of Azelaaldehydic Acid and Poly(ester-acetals) Therefrom

WILLIAM R. MILLER, JOHN C. COWAN, and EVERETT H. PRYDE
U.S. Patent 3,287,326. November 22, 1966

The novel compound isopropylideneglyceryl azelaaldehyde dimethyl acetal undergoes hydrolysis polymerization in the presence of organic

solvent and mineral acid to form a poly(ester-acetal) having a structure analogous to that in U.S. Patent 3,285,880.

Process for Preparing Debittered Full-Fat Soybean Materials

GUS C. MUSTAKAS and EDWARD L. GRIFFIN, JR.
U.S. Patent 3,290,155. December 6, 1966

Full-fat debittered soybean agglomerates free of trypsin inhibitor and urease, and which can be milled to a shelf-stable 100-mesh flour suitable for preparing soy milk having a high biological efficiency, are quickly prepared by progressively subjecting full-fat flakes or grits containing from 9 to 12% moisture to sparge steam for 2.5 to 3.0 minutes to provide a flake temperature not in excess of about 95°C ., admitting more steam during the succeeding 5 to 10 seconds to provide a flake temperature of 99° to 102°C . and a moisture content of 16% to about 21%, admitting the hot, moist,

soybean material to a steam-jacketed screw extruder equipped with air-lock dies and highly perforated final die, during residence time of 60 to 90 seconds, increasing the flake temperature to between 115° and 145°C . while applying a dynamic pressure on the flakes of about 375 to 400 p.s.i. so as to express therefrom only an amount of free oil that can be immediately resorbed from the surface as the hot material explodes on passing through the final die into atmospheric pressure, and cooling and drying the agglomerates to a moisture content of 3 to 4%.

Carbohydrate Aliphatic and Cyclic Acetals

MARY OLLIDENE WEAVER and CHARLES R. RUSSELL

U.S. Patent 3,294,781. December 27, 1966

Acetals of carbohydrates including those of starch, microbial polysaccharides, amylose, and such hexoses as glucose are prepared by reacting under essentially anhydrous conditions and in the presence of an acid catalyst a dimethyl sulfoxide dispersion or solution of the carbohydrate with an aliphatic vinyl ether having up to 18 carbons in the aliphatic chain or with a cyclic vinyl ether, particularly 3,4-dihydro-2H-pyran. Products have

degrees of substitution (D.S.) ranging from 0.03 to 2.6. Those having a low D.S. are water-soluble and exhibit extraordinary resistance to flaking from synthetic fibers which have been sized therewith. Members from a long-chain fatty vinyl ether (saturated or unsaturated) are waxy or are organic solvent-soluble members that can be employed as protective coatings.

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